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ABSTRACT

This unit of instruction was designed for the slow reader and terminal student, and consists of a study of the economic value of plants and a consideration of landscaping, gardening and horticulture for fun and profit. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, guest speakers, field trips, and topics for student projects, reports, and discussions. Also listed are relevant films and filmstrips available from the Dade County Audiovisual Center. Reference books and other materials and resources are recommended, and a master sheet is provided relating each suggested activity to the specific performance ojectives. (JR)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

PLANT ECONOMICS

5314.07

SCIENCE

(Experimental)

SE 016 512

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

ED 079135

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5314.07

SCIENCE

(Experimental)

Written by Fred D. Basnett
for the
DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1972

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PLANT ECONOMICS

COURSE DESCRIPTION

Study of the economic value of plants, includes landscaping, gardening and horticulture, for fun and profit.

ENROLLMENT GUIDELINES

This course is designed for the terminal student, either as a part of the basic biology requirement or as an interest course. The slow reader should be encouraged to take this subject.

STATE ADOPTED TEXTS

The nature of this course is orientated toward involvement with less emphasis on reading. There are no state adopted texts available, but the following contain many relevant areas for study:

1. Biological Sciences Curriculum Study. Biological Science: An Inquiry Into Life. 2nd ed. New York: Harcourt, Brace and World, 1968.
2. Biological Sciences Curriculum Study. Biological Science: Molecules to Man. 2nd ed. Boston: Houghton Mifflin Company, 1968.
3. Biological Sciences Curriculum Study. High School Biology. 2nd ed. Chicago: Rand McNally and Company, 1968.
4. Brandwein, et al. The Earth: It's Living Things. New York: Harcourt, Brace, Javanovich, Inc., 1970.

PERFORMANCE OBJECTIVES

1. The student will differentiate between types of leaf veination.
2. Given specimens of monocot and dicot plants, the student will describe the characteristics of each.
3. Given a series of plant pests and diseases. the student will associate the problems caused by these to the appropriate plant.
4. Compiling data from the growth rate of a vegetable sprout and a hardwood tree seedling, the student will plot a graph showing the difference in growth rate over a four week period.
5. After visiting the school woodshop,the student will describe characteristics and functions of several wood types.
6. Given selected species of insects, their classifications and mouth part types, the student will identify the method by which each insect obtains food from a plant.
7. Given selected samples of citrus tree foliage, the student will differentiate each type.
8. Given selected types of plants sold on the commercial market, the student will explain the methods of propagaton and production.
9. Given the seeds from several plants, the student will discern how these seeds are dispersed under natural conditions.
10. Given a series of selected species of important economic plants, the student will distinguish the useful and economic characteristics of each.

COURSE OUTLINE

I. Techniques of Plant Identification

   A. Morphology

      1. Leaves
      2. Stems
      3. Roots

COURSE OUTLINE (Continued)

B. Taxonomy

1. Poisonous and non-poisonous
2. Plants of medicinal value
3. Hardwood species
4. Softwood species
5. Grasses
6. Grains

II. Horticulture

A. Identification of citrus

B. Economic problems

1. Plant pests
2. Animal pests
3. Weather limitations
4. Cycles of productivity
5. Pesticides

C. Production and planting

1. Grafting techniques
2. Pruning
3. Fertilizer requirements

D. Grove and field crops

1. Vegetables
2. Sugar cane
3. Mango and avocado
4. Orange, grapefruit, lime
5. Banana

COURSE OUTLINE (Continued)

III. Landscaping

A. Home

1. Lawn

2. House, outside and inside

B. Tree and shrub types

C. Landscape architecture

D. Soil chemistry

IV. Specific Plant Topics of Economic Importance

A. Vegetable gardening

B. Flower arrangement

C. Furniture making

D. Sod farming

E. Pulp and paper industry

F. Plywood and lumber industry

G. Medicinal plants

H. Tree farming

I. Grocery sales and distribution

EXPERIMENTS

Otto, Towle, Cirder. Biology Investigations. New York: Holt, Rinehart and Winston, Inc., 1965.

1. The External Structure of a Woody Twig (ex. 24-1, p. 207)
2. Comparison of Twig Structures (ex. 24-1 B, part 3, p. 209)
3. Tissues of a Woody Dicot Stem (ex. 24-2 A, part 1, p. 211)
4. Tissues of Herbaceous Dicot and Monocot Stems (ex. 24-2A, part 2, p. 212)
5. Structure of a Flower (ex. 26-1 A, part 1, p. 223)
6. Fleshy Fruits (ex. 26-3 A, part 1, p. 229)
7. Steps in Germination of a Dicot and Monocot Seed (ex. 25-5, p. 233)
8. The Grasshopper (ex. 31-1, p. 267)

EXPERIMENTS (Continued)

Lesser, Milton S. Life Science. New York: Amsco School Publications, Inc., 1967.

9. How Plants Get Food and Life (ex. 6, pp. 41-46)

Thrasher, Frank P. Exercises for Biological Principles in Agricultural Crops. San Luis Obispo, California: Vocational Education Productions, California State Polytechnic College, 1968.

10. Light (ex. 1, p. 5)
11. Moisture (ex. 2, p. 7)
12. Plant Competition (ex. 4, p. 11)
13. Measurement of Growth in Stems (ex. 14, p. 39)
14. Control of Weeds (ex. 18, p. 47)

Adell, James C. and Welton, Louis E. A Laboratory Course in Biology. New York: Ginn and Company, 1951.

15. In What Ways are the 700,000 Species of Insects Scattered All Over the World Alike? (Unit II, ex. 1, p. 22)
16. What Life Processes Do Plants and Animals Have in Common. (Unit II, ex. 2, p. 26)
17. What is the Economic Importance of Common Insects? (Unit II, ex. 3, p. 28)
18. What is the Structure of Twigs and Stems? (Unit V, ex. 1, p. 62)
19. What is a Green Leaf Like Under the Microscope? (Unit V, ex. 3, p. 65)
20. How do Monocot and Dicot Seeds Differ? (Unit V, ex. 5, p. 70)
21. What is the Structure of Twigs and Stems? (Unit V, ex. 6, p. 72)

Elliott, A. M. Laboratory Guide for Zoology. Minneapolis, Minnesota: Burgess Publishing Company, 1959.

22. Grasshopper Dissection (p. 107)
23. Honey Bee Dissection (p. 114)
24. Insect Metamorphosis (p. 118)

PROJECTS

1. Using correct drying techniques, collect 15-20 different examples of plant leaves. Identify them and give a summary of the leaf type, leaf arrangement, margin and average leaf size. Mount each on white paper and place in a booklet.

2. Observe microscope slides of a typical monocot and dicot plant. Sketch these tissues, note the differences and list various cell characteristics.

3. Visit a local nursery. List the steps taken to raise a plant from a seed to a commercial size. How are the seeds grown, what necessary requirements for healthy plants are necessary? How is transplanting done?

4. Study some of the commonly used products from wood. List some of the characteristics of the wood that are desirable for each of these products.

5. Visit a local florist and discuss various techniques used to manufacture flower basket and other arrangements. Find out where the flowers came from and which ones are used seasonally.

6. Visit a local lumber yard, making a list of different woods available, the various prices, where each kind of wood is shipped from, what each is used for and the types of employment available in the lumber industry.

7. On a large sheet of paper draw an outline of your house or a floor plan taken from a home magazine. From pictures in this type of magazine "landscape" your outline with the type of plant you think makes the home more beautiful.

8. Make a survey of different kinds of wood commonly used. State the "tensile" strength, the good and bad characteristics of each and the processes necessary to "finish" the wood for its desired use.

9. Visit a roadside stand that sells sod. Find out what type of sods are available on the market, their prices, which sods are "insect proof" and where sod farms are located. If possible, collect three or four types, plant them side by side and observe their rate of growth.

10. Make a study of some 20 food products in a grocery store and determine whether the food item is a root, stem or leaf or part of the reproductive system of the plant.

PROJECTS (Continued)

11. Study the technique of "air-layering" and produce two or three new plants by this technique. Discuss the particular types of plant tissue involved with the new growth.

REPORTS AND DISCUSSION QUESTIONS

1. Describe the cross section of a typical leaf relating the part each different type of tissue plays in the overall function of the leaf and the entire plant.

2. Describe some of the local types of vegetation used for home landscaping. What are some of their particular characteristics as to growth rate, hurricane resistance, root system, amount of debris, flower type, color and fertilizer requirements.

3. What are some of the important differences between the monocot and dicot group of plants? Make a list of some of the more common monocots.

4. What are some of the more important food plants in the world? List ten primary food sources and the type of plant from which each come.

5. List the parts of a typical seed and relate the differences between the monocot and dicot seed and seedling.

6. Why are many plants grown under shade, as in certain nursery stock? What is meant by the optimum sunlight necessary for most rapid growth?

7. What is meant by "tensile" strength of wood? What are some of the different uses of plants with high tensile strength as opposed to the use of those with low tensile strength.

8. How does a pine tree produce seeds? What are some of the many uses of this example of a softwood angiosperm?

9. What are some of the steps necessary to transplant a small tree or large shrub? What is meant by "root pruning".

10. Grafting is an asexual method of producing a plant. What is the difference between sexual and asexual production of flowering plants?

REPORTS AND DISCUSSION QUESTIONS (Continued)

11. In order to transplant a larger shrub or small tree successfully, one should "root prune" it. Why is this a more successful method than to immediately dig the plant from the ground in order to transplant it?

12. What are some of the more common plant insect pests in your locale? What are some of the physical characteristics of each and how do they actually damage the particular plant?

13. What is meant by insect metamorphosis? What are some different types of metamorphosis? Give examples of insects that illustrate these types.

14. How is lumber pressure treated to resist molds and insect penetration? What are some of the different types of pressure-treating substances used?

15. What are some of the more common drugs derived from processing plants? Where in our nation do particular kinds of important drug producing plants grow?

16. List and discuss some of the more poisonous plants in the locale. What are some of the ways these plants cause a problem for man? For domestic animals?

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER

1. Acid-Base Indicators
   AV# 1-10799, 19', C, JS

2. Conserving our Water Resources Today
   AV# 1-00426, 11', C

3. Conserving our Forests Today
   AV# 1-03767, 11', C, JS

4. Population Ecology
   AV# 1-30489, 28', C, JS

5. Atmosphere and Life on Earth
   AV# 1-01823, 11', C, EJS

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER (Continued)

6. Birth of the Soil
AV# 1-03696, 11', C, EJS

7. Careers in Agriculture
AV# 1-10327, 14', C. JS

8. Cicada, Insect Methuselah
AV# 1-11166, 12', C. JS

9. Conserving our Soils Today
AV# 1-00426, 11', C and B/W, EJ

10. Fire Lookout
AV# 1-11335, 13',C , PEJS

11. Flowers and their Purpose
AV# 1-11105, 15', C, EJ

12. Forest Conservation
AV# 1-03744, 10', C, JS

13. Forest Products, The
AV# 1-03742, 10', C, S

14. From Trees to Lumber
AV# 1-11605, 14', B/W, EJS

15. From Trees to Paper
AV# 1-11607, 13', B/W, JS

16. Fruits of Plants, The
AV# 1-11106, 12', C, EJ

17. Growth of Seeds
AV# 1-11103, 14', C, JS

18. Insect Collecting
AV# 1-11155, 14', C, EJS

19. Gypsy in the Trees
AV# 1-11172, 21', C, JS

20. Insect Enemies and their Control
AV# 1-02765, 11', C, EJS

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER (Continued)

21. Insects
AV# 1-02760, 11', C, JS

22. Knowing Woods and Their Uses
AV# 1-11618, 13', B/W, JS

23. Life in a Garden
AV# 1-11041, 12', B/W, EJS

24. Plant Life at Work
AV# 1-02280, 10', C, EJS

25. Plant Reproduction
AV# 1-30649, 28', C, S

26. Regulation of Plant Growth
AV# 1-30469, 28', C, B/W

27. Seed Dispersal
AV# 1-02293, 11', B/W, JS

28. Story of Soil, The
AV# 1-03718, 11', B/W, JS

29. Story of Sugar, The
AV# 1-04063, 12', B/W, EJ

30. Trees: How We Identify Them
AV# 1-02359, 11', C, B/W, EJ

31. Truck Farmer, The
AV# 1-03776, 11', B/W, JS

FILMSTRIPS

1. Introduction to the Microscope
SVE Films, A448-1

2. Methods of Identifying Trees
Film of the Month Club, 1526

3. How Man Destroys Soil
SVE Films, A429-2

FILMSTRIPS (Continued)

4. What the Settlers Did to Wildlife
SVE Films, A429-5

5. Forest Fires, Kinds, Causes, Cost and Control
SVE Films, A429-9

6. Controlling Erosion in Fields and Woods
SVE Films, A 429-3

7. Aiding Wildlife of Field and Stream
SVE Films, A429-7

8. What Makes Up a Flower Family
SVE Films, A465-1

9. Structure of Flower Plants
SVE Films, A465-2

10. Problems of Wildlife Today
SVE Films, A429-6

11. Life in the Soil
Popular Science Publishing Co., 1549

12. Population and Food
Film Strip of the Month Club

13. How Hormones Regulate Plant Growth
McGraw-Hill, Popular Science Filmstrip, 171726

GUEST SPEAKERS AND FIELD TRIPS

1. Department of Agriculture
2690 N. W. 7th Avenue
Miami, Florida - or -

1102 N. Krome Avenue
Homestead, Florida

2. School Agriculture Farms

GUEST SPEAKERS AND FIELD TRIPS (Continued)

3. Extension Forester
   Division of Forestry
   6531 State Road 84
   Fort Lauderdale, Florida 33314

4. School Wood Shop

5. Florists and Floral Arrangements

6. Garden Clubs

7. Lawn Maintenance and Gardening Personnel

8. Local Nurseries

9. Fairchild Tropical Garden
   10901 Old Cutler Road
   Coral Gables, Florida

10. Furniture Manufacturing Company

11. Exterminators

12. Garden and Pet Shops

13. Cattlemen and Dairy Owners

14. Citrus Growers

15. Lumberyard Personnel

16. Produce Personnel

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2. Biological Sciences Curriculum Study. Biological Science. BSCS Green Version Laboratory and Field Investigations. Chicago: Rand McNally and Company, 1963.

3. Biological Sciences Curriculum Study. Biological Science: An Inquiry Into Life. 2nd ed. New York: Harcourt, Brace and World, 1968.

4. Biological Sciences Curriculum Study. Biological Science: Molecules to Man. 2nd ed. Boston: Houghton Mifflin Company, 1968.

5. Biological Sciences Curriculum Study. High School Biology. 2nd ed. Chicago: Rand McNally and Company, 1968.

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7. Carlock, John R., and Moore, Harold A. In the Laboratory, The Spectrum of Life. New York: Harper and Row, 1970.

8. Carson, Rachael. Silent Spring. Greenwich, Connecticut: Fawcett Publications, Inc., 1967.

9. Dasmann, Raymond F. Environmental Conservation. New York: John Wiley and Sons, Inc., 1968.

10. DeWaard, John E. What Insect is That? Middletown, Connecticut: American Educational Publications, 1969.

11. Elliott, A. M. Laboratory Guide for Zoology. Minneapolis, Minn.: Burgess Publishing Company, 1959.

12. Fitzpatrick, Frederick L. Our Plant Resources. New York: Holt, Rinehart and Winston, 1964.

13. Hill, Albert F. Economic Botany. New York: McGraw Hill Book Co., 1952.

14. Jaques, H. E. How to Know the Insects. Dubuque, Iowa: Wm. C. Brown Company, 1947.

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18. Maxwell, Lewis S., Publisher. Florida Flowers, Annuals and Bulbs. Tampa, Florida: Lewis Maxwell Publications, 1966.

19. Maxwell, Lewis S. Florida Fruit. Tampa, Florida: Lewis Maxwell Publications, 1967.

20. Maxwell, Lewis S. Florida Insects, Their Habits and Control. Tampa, Florida: Lewis Maxwell Publications, 1965.

21. Maxwell, Lewis S. Florida Lawns and Gardens. Tampa, Florida: Lewis Maxwell Publications, 1966.

22. Maxwell, Lewis S. Florida Plant Selector. Tampa, Florida: Lewis Maxwell Publications, 1968.

23. Maxwell, Lewis S. Poisonous Plants, Snakes, Insects. Tampa, Florida: Lewis Maxwell Publications, 1963.

24. Odum, Eugene P. Fundamentals of Ecology. Philadelphia and London: W. B. Saunders Company, 1961.

25. Otto, Towle, Crider. Biology Investigations. New York: Holt, Rinehart and Winston, 1965.

26. Thrasher, Frank P. Exercises for Biological Principles in Agricultural Crops. San Luis Obispo, California: California State Polytechnic College, 1968.

27. Went, Fritz, W. The Plants. New York: Time Inc., Book Division of Life Magazine, 1963.

MATERIALS AND RESOURCES

Leaf Cross Section

12 razor blades

Microscope slides

Cover slips

10 copies, BSCS Green Version Lab Manual, "Diversity in the Plant Kingdom", p. 88

10 copies Life Science, Amsco School Publications, "How Plants Get Food and Live", pp. 41-46

Geranium plant

Aluminum foil

Glass tumblers

10 copies Biological Science: Patterns and Processes, Holt, Rinehart and Winston, "Leaf Cross Section", p. 111

5 copies Economic Botany, Hill

10 copies The Plants, Life Nature Library

Wood samples - Albert Constantine and Sons Inc.
2050 E. Chester Road
New York 61, New York

MASTER SHEET--PLANT ECONOMICS

Objectives	Reading	Experiments	Films	Film Strips	Reports/Discussion Questions	Projects
1	#17. pp. 104-116 #6. pp. 110-135 #5. pp. 153-186	1,4,7,19	23-30	1,2	1,3	1,2
2	#17. pp. 104-116 #6. pp. 110-135 #5. pp. 153-156	3,4,7,20	17,30	2,8	1,3,4	1,2
3	#8. pp. 65-82 #6. pp. 260-280	14,15,17,24	3,4,8,18,20	11	4,12,13	3
4	#17. pp. 104-115 #5. pp. 153-168	7,13	1,2,3,17,25,26		2,3,5,6,11	3
5		4,21	13,14,15,22,29,30	2,9	2,4,7,14	4,6,8
6	#6. pp. 176-185	15,17,22,23,24	8,18,20,21		4,12,13	
7	#19. pp. 9-104	6,19,20	16,30	2,8,9	1,2,3,4,9,10,11,12	1,3,10
8	#19. pp. 9-104 #22. pp. 1-110 #18. pp. 4-118	7,10,11,12	7,14,22,29,30,31	9	2,4,8,10,11,14,15	3,5,8,9,10,11
9	#6. pp. 110-135 #17. pp. 104-116	5,6,7	3,4,11,17,25,5,27		2,3,5,8,10	
10	#19. pp. 9-104 #22. pp. 1-110 #18. pp. 4-118	6,17	3,6,7,12,13,14,15,22,30	2,12	2,3,7,10,12,14,15,16	5,7,8,9,10